



PLETRONICS SM22K 32.768kHz 2016 CMOS Clock Oscillator



SM22K
2.05 x 1.65 x 0.75 mm
LCC Ceramic Package

Features

- Quartz crystal controlled precision square wave oscillator
- CMOS Output
- Enable/Disable Function
- 1.6 ~ 3.63V nominal Supply Voltage
- 32.768 kHz

Applications

RTC
Smartphone
IoT
Wearable Device
Watch
Medical

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Frequency	-	32.768	-	kHz	
Frequency Stability	±20*	-	±50	ppm	Includes supply voltage change, load change, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. *See page 2
Operable Temperature Range	-20 -40	-	+70 +85	°C	
Supply Voltage ¹ V _{CC}	1.6	3.3	3.63	V	
Input Current I _{CC}	-		35	µA	No Load
Output Disabled Current I _{CC}	-	-	5	µA	
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	At 50% V _{CC} level; C _{LOAD} = 15 pF
Output V _{HIGH} (I _{OH} = -1mA)	V _{CC} -0.4	-	-	V	
Output V _{LOW} (I _{OL} = 1mA)	-	-	0.4	V	
Output T _{RISE} and T _{FALL}	-	-	50	ns	C _{LOAD} = 15 pF 10% to 90% of V _{CC} See Load Circuit
Startup Time	-	-	20	ms	Time for output to reach specified frequency
V _{DISABLE} V _{IL}	-	-	0.3V _{CC}	V	Of V _{CC} applied to Pad 1
V _{ENABLE} V _{IH}	0.7V _{CC}	-			
Enable/Disable Pullup Resistance	50	100	150	kΩ	Pad 1 low
Output Disable Time	-	-	1	µs	
Output Enable Time	-	-	20	ms	
Aging 1st Year	-	-	±3	ppm	At 25°C
Storage Temperature Range	-55	-	+125	°C	

Notes:

¹ Place an appropriate power supply bypass capacitor next to device for correct operation



PLETRONICS SM22K 32.768kHz 2016 CMOS Clock Oscillator

Part Number (Example: SM2245KE-32.768K)

Series Model	Frequency Stability		Operating Temperature Range	Frequency	Optional T&R Packaging code
SM22	45	K	E	- 32.768K	-XX
	45 = ± 50 ppm 44 = ± 25 ppm 20* = ± 20 ppm		C = -20 to +70°C E = -40 to +85°C	32.768 kHz	T250 = 250 per Reel T500 = 500 per Reel T3K = 3000 per Reel (Std)

* Includes aging for -20 to +70°C, excludes aging for -40 to +85°C

Device Marking

P32K
• YMxxx

P = Pletronics
32K = 32.768 kHz
YM = Date Code, All other marking is internal code

Note: Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YM (Year Month)

Code	3	4	5	6	7	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2023	2024	2025	2026	2027	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Package Labeling

P/N Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

RoHS Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

P/N:	
	PLE Part Number
Customer P/N:	
	12345678
Qty:	
	3000
D/C	
	2A1
MSL: 1	

RoHS Compliant

2nd Lvl Interconnect

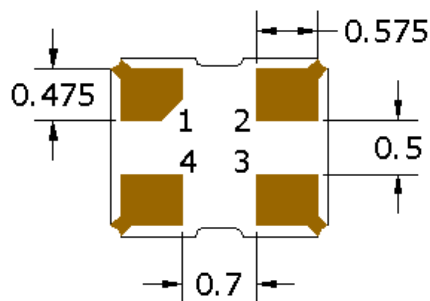
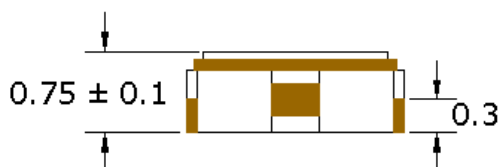
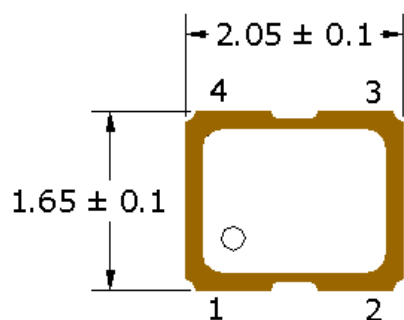
Category=e4

Max Safe Temp=260C for 10s 2X Max

Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.012 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

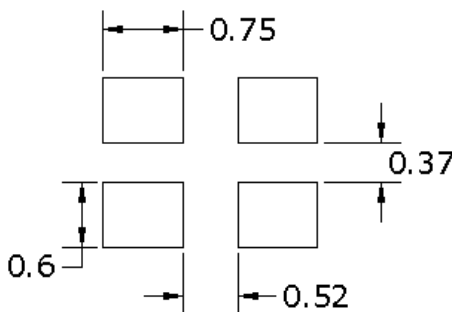
Mechanical Dimensions



Pad Connections

Pad	Function
1	Enable/Disable
2	Ground
3	Output
4	Vcc

ENABLE/DISABLE	
Pad 1	Output
V _{IH} /Open	Active
V _{IL} /Gnd	Disabled/Tristate



Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

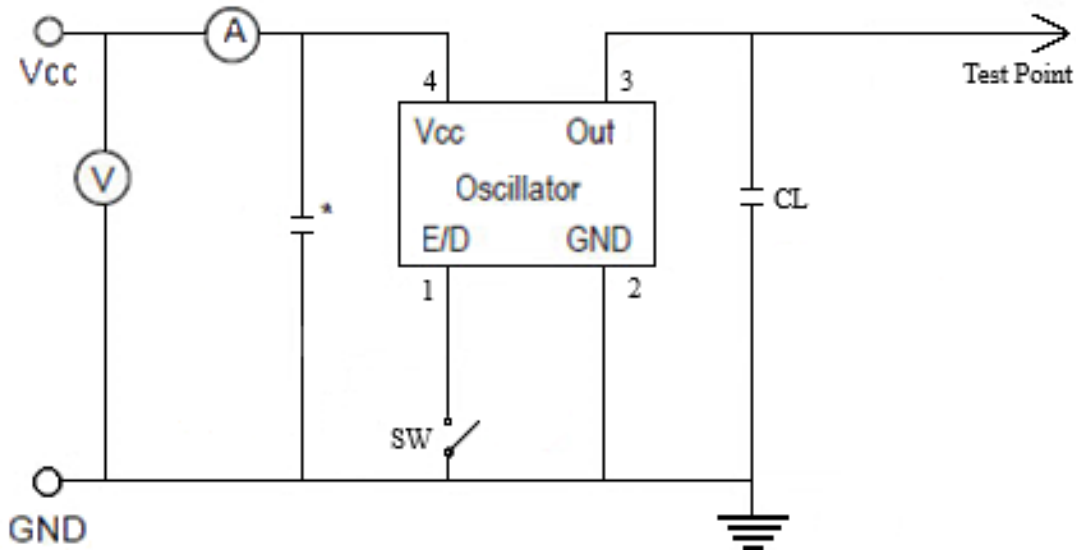
Dimensions in mm

Contacts (pads): Gold (0.3 to 1.0 μ m) over Nickel (1.27 to 8.89 μ m)

For Optimum Jitter Performance, Pletronics recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

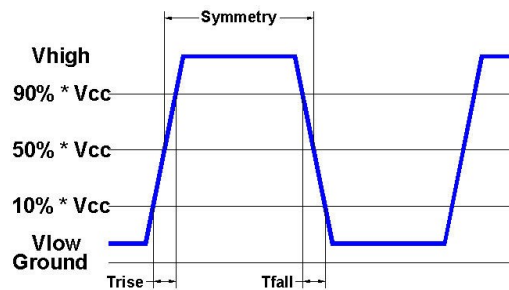
Electrical Test / Load Circuit



Notes:

CL: 15pF Includes the input capacitance of oscilloscope

* 0.01μF external by-pass filter is recommended



Environmental / ESD Ratings

Reliability: Environmental

ESD Rating

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Machine Model	200V	JESD22-A115

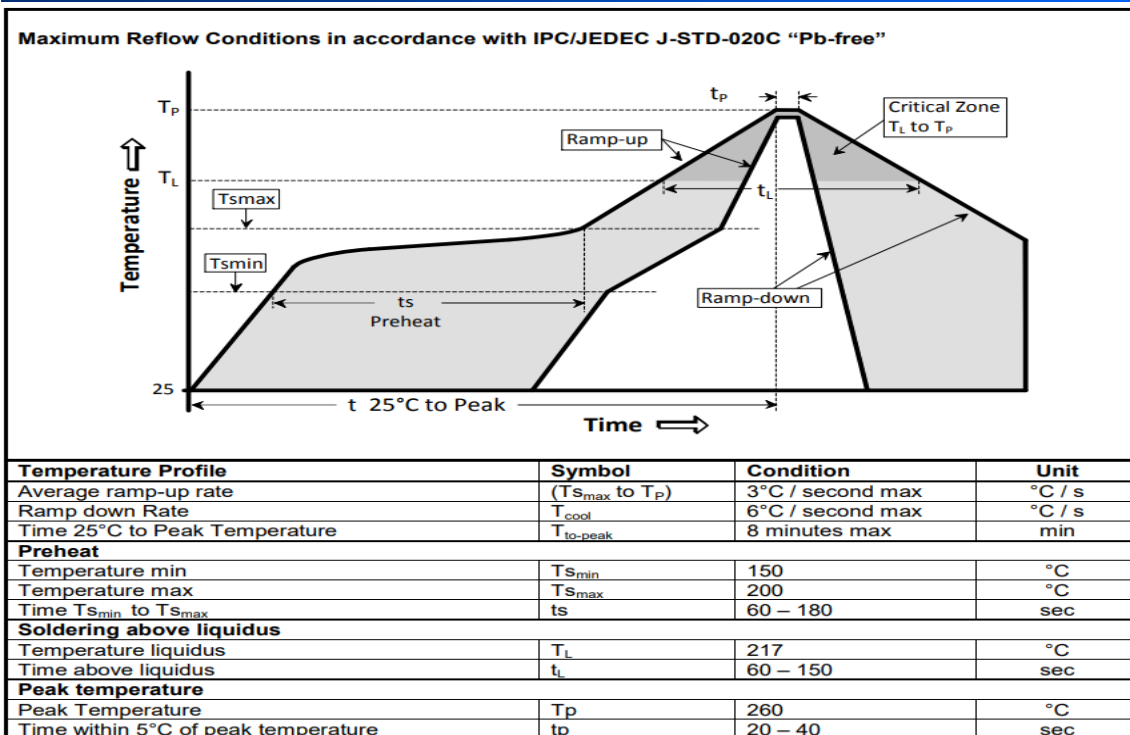
Absolute Maximum Ratings

Parameter	Unit
Vcc Supply Voltage	-0.3V to +4.5V
Vi Input Voltage	-0.3V to +4.5V
Vo Output Voltage	-0.3V to +4.5V

Thermal Characteristics:

The maximum die or junction temperature is 150°C

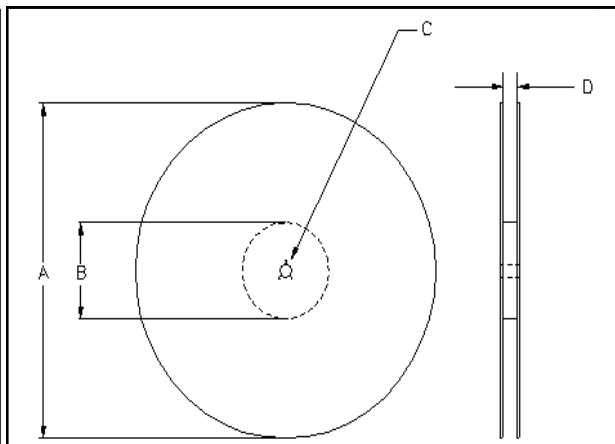
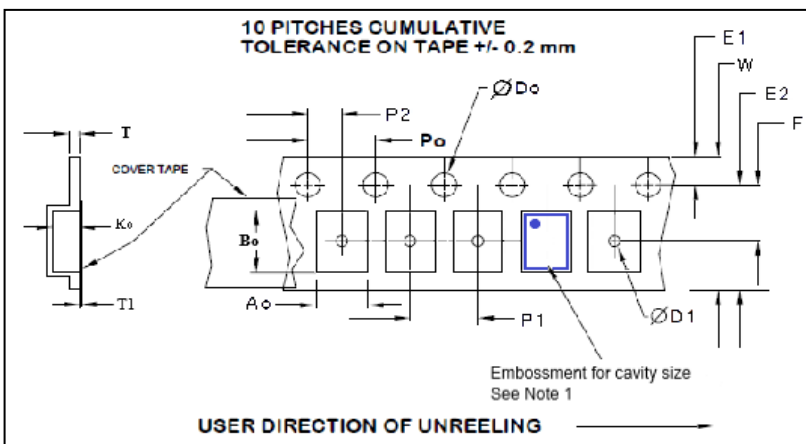
Reflow Cycle



The part may be reflowed 2 times without degradation (typical for lead free processing).

Tape and Reel

Tape and Reel available for quantities of 250 to 3000 per reel, cut tape for < 250. 8mm tape, 4mm pitch.



Tape Variable Dimensions Table 2

Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.2	1.9±0.1	2.3±0.1	0.9±0.1

Dimensions in mm Drawing Not to scale

Note 1: Embossed cavity to conform to EIA-481-B

Tape Constant Dimensions Table 1

Tape Size	Do	D1 min	E1	Po	P2	T max	T1 max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.3	0.1

Reel Dimensions (may vary) Table 3

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
7	7.0	177.8	2.42	61.5	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0



PLETRONICS SM22K 32.768kHz 2016 CMOS Clock Oscillator

Important Notice

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's limited warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE products are not designed, intended, authorized or warranted to be suitable for use in life support applications, weapons, weapon systems or space applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of PLE products in such applications is understood to be fully at the risk of the customer. Use of PLE products in such applications requires the written approval of an appropriate PLE officer. Questions concerning potential risk applications should be directed to PLE.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

Contacting Pletronics Inc.

Pletronics, Inc.
19013 36th Ave. West
Lynnwood, WA 98036-5761
U.S.A.

Tel: 425.776.1880
Fax: 425.776.2760
email: ple-sales@pletronics.com
URL: www.pletronics.com